



MULTIDISCIPLINARY CENTER FOR EARTHQUAKE ENGINEERING RESEARCH

A National Center of Excellence in Advanced Technology Applications

Bulletin

NYCEM Project Nears Completion

Researchers participating in the New York City-area Consortium for Earthquake Loss Mitigation (NYCEM) are completing the third year of HAZUS-based scenario studies for a 31-county study area of contiguous areas of New York, New Jersey and Connecticut. The team effort, sponsored by FEMA, the New York State Office of Emergency Management (NYSEMO), New Jersey Office of Emergency Management and coordinated by MCEER, involves researchers from Princeton University, Columbia University and professionals from several State and County agencies in New York, New Jersey and Connecticut. The key elements of the study are to:

- Develop a comprehensive building inventory by acquiring detailed building information, performing physical surveys and using expert engineering opinion.
- Assemble a detailed soil profile of the tri-state region.
- Perform deterministic and probabilistic scenario simulations in the New York City area using modified soil information and the new building inventory. These simulations forecast quantitative estimates of building damage, economic loss and casualties.
- Perform a detailed critical (essential) facilities analysis, assessing probable damage and functionality loss of hospitals, police stations, shelters, etc.
- Interpret these results and provide informed insight about the potential risks involved.

This is being accomplished through the systematic integration of building inventory data and more accurate characterizations of soil type and distribution into the HAZUS framework. A notable accomplishment of the study to date is the establishment of a building inventory for Manhattan at an individual level for all buildings, including structure and occupancy type, square footage, height, and other such factors. Considering the vast diversity of Manhattan's building stock, this is a unique achievement for HAZUS applications, making it one of the most-detailed and site specific seismic studies to date.

Princeton University Ph.D. candidate, Michael W. Tantala, presented the team's most recent findings in a paper and exhibited poster at the 7th National Conference on Earthquake Engineering in Boston this past July. These may be found on the NYCEM web site at <http://www.nycem.org>.

The intended outcome of the project will be a regional loss estimation model that can project economic losses for the area in the event of a damaging earthquake.

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Proceedings of the MCEER Workshop on Lessons from the World Trade Center Terrorist Attack

Student Research Accomplishments: 2001-2002

New Members/Industry Advisory Board Underscore Strengthened Partner Involvement



A few changes, a few new members, and a new Industry Advisory Board (IAB) have brought forth greater involvement and benefits for members of MCEER's Strategic Partnerships Network. Center leadership made some strategic improvements to the program over the last several months, to enhance interaction among partners, center investigators, and students, for greater mutual reward.

The most notable of changes involves the creation of an Industry Advisory Board or IAB. The IAB comprises business and industry members of the center's Strategic Partnerships Network, and strategic federal, state and local government agencies and end-users (see Vol.16, No.1).

The IAB provides direct input to the center's strategic plan, and represents the interests and needs of IAB member organizations. It also assists the center by conducting an annual industry SWOT analysis, helping to identify Strengths, Weaknesses, Opportunities and Threats that could impact MCEER's overall success. The IAB is governed by an executive committee (IAB ExCom), chaired by Gary Hart, principal and division head, Hart-Weidlinger Division of Weidlinger Associates.

Members that have joined the IAB and the center's Strategic Partnerships Network in the past year include: Armstrong World Industries, Inc., FM Global Research, Hydro-Québec TransÉnergie, and Unison Industrial Company, Ltd. Armstrong and FM Global have joined at the Premier Partner level (\$3,500 annually). Hydro-Québec and Unison have joined as Partners (\$1,000 annually).

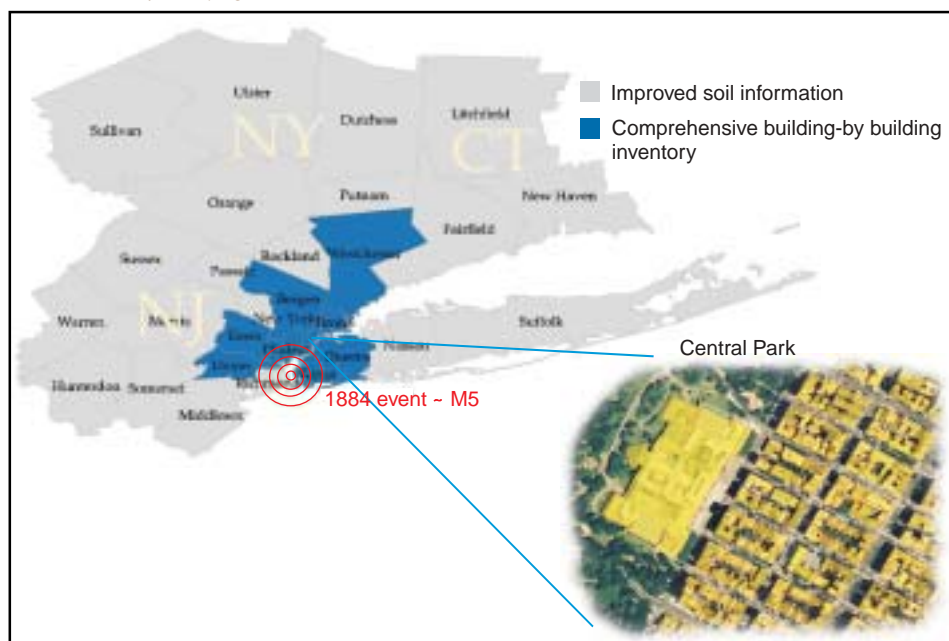
Armstrong World Industries, Inc., is a global leader in the design, innovation,

manufacture, and marketing of interior finishing solutions. FM Global is an insurance organization focusing on risk management and helping customers maintain continuity in their business operations by helping them minimize the overall financial impact of losses.

Hydro-Québec TransÉnergie is a Canadian-headquartered company and a leader in the design, operation and maintenance of power transmission systems. Unison, based in South Korea, is a producer of various products from anti-noise and anti-vibration materials to seismic isolators. ❖

NYCEM Project Nears Completion

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■ Study region of the NYCEM project.

The model will enable emergency management officials, business owners, facilities managers and others to address vulnerabilities and to begin development of plans to reduce their respective exposure to earthquake risk. Recognizing a growing need to adopt an all-hazards approach to mitigation, this effort is seen as a first step toward building a robust disaster management program.

A preliminary validation of the HAZUS model was conducted by the New York State Emergency Management Office (SEMO) using the April 20, 2002 Au Sable Forks, NY, 5.0 M_w earthquake as a test case. A comparison was made between the actual losses sustained from this event with HAZUS estimated losses based on scenario inputs intended to mirror the Au Sable Forks event. A discussion of this benchmark study will be included as part of a final report detailing the outcomes of the 31-county study. The report is presently under preparation and will be made available on the NYCEM web site. ❖

Update on the Seismic Instrumentation of the Bill E. Emerson Memorial Bridge

The Bill E. Emerson Memorial Bridge is a cable-stayed signature bridge that crosses the Mississippi River at Cape Girardeau, Missouri, two hours south of St. Louis. MCEER is working with the US Geological Survey (USGS) on the design and acquisition of seismic instrumentation for the bridge under its Highway Project research program, sponsored by the Federal Highway Administration (FHWA). The bridge is owned jointly by the states of Missouri and Illinois, and construction is scheduled to be complete by October 2003. It will be opened to traffic immediately afterwards. This article is the next installment in a series about the project (see Vol. 15, Nos. 3 and 4, Vol. 13, No. 3).

On October 2-3, 2002, a project planning meeting was held to discuss the final plan for seismic instrumentation of the Bill E. Emerson Memorial Bridge. Held in Cape Girardeau, Missouri, twenty-two members of the project team met to review progress and identify remaining outstanding issues.



■ Dr. Celebi explains the proposed seismic instrumentation plan.

The meeting began with an introduction by Peter Clogston, FHWA – MO Division. Next, Dr. Mehmet Celebi, USGS, presented the proposed instrumentation plan, which has evolved over the course of six years through previous meetings and discussions with the proposed vendor (Kinematics) and future users. Details of the instrumentation system include the following:

- All instrumentation will be installed above elevation 355.0, per U.S. Coast Guard requirement.
- Towers will be monitored for motions longitudinally and transversely.

Spans will be monitored for movement longitudinally and vertically.

- The instrumentation system will consist of 84 channels (including those for the free fields).
- Installation will be done after the bridge is opened to traffic and is expected to take one or two months.
- Data will be recorded and made available in real-time.
- Sensors will be connected to a six-channel digitizer (i.e., Q330) to minimize wiring. Each of these transmits via wireless to a Control Center Gateway.
- The ASPEN software has an open architecture so additional sensors can be added in the future if desired.
- The instrumentation scheme will provide for back up of collected data.
- Features that address security/terror concerns can be incorporated into the system in the future.
- There is a lightning protection system on the bridge and in the instrumentation scheme.

Participants discussed the possibility of adding wind monitoring equipment to the instrumentation package. The FHWA is investigating alternatives to see if integrating the two systems is the most cost effective way to provide for wind instrumentation. FHWA also plans to conduct tests to obtain data on the dynamic properties of the cables. ❖

KEERC-MCEER Joint Seminar on Earthquake Engineering



■ The KEERC-MCEER workshop provided an opportunity for graduate students from both Centers to meet and share their research in a formal setting.

The first KEERC-MCEER Joint Seminar on Contributions to Earthquake Engineering was held in Buffalo, New York on July 30 – August 1, 2002. It was sponsored by the Korea Science and Engineering Foundation, National Science Foundation, Brain Korea 21, and MCEER.

Presentations focused on the development and application of advanced technology in earthquake hazard mitigation and response. Graduate students from both Centers (MCEER and the Korea Earthquake Engineering Research Center-KEERC) presented research work to their peers as well as to professionals in earthquake engineering research. Twelve students from each country made presentations, and an underlying goal of the workshop was to provide an opportunity for these young professionals to become acquainted with their peers, to strengthen the bond between U.S. and Korean researchers in earthquake-related studies.

The proceedings are currently being compiled and will be available from KEERC in the near future. ❖

PRC-US Workshop on Seismic Analysis and Design of Special Bridges

The *PRC-US Workshop on Seismic Analysis and Design of Special Bridges* is the first in a series of workshops to be conducted between bridge and earthquake engineering researchers in China and the United States. This first workshop was held in Shanghai, China, on October 8-10, 2002 at Tongji University. The next workshop is planned for the fall of 2003 in Buffalo, New York. Participation by the U.S. delegation was part of MCEER's Highway Project, sponsored by the Federal Highway Administration.

The workshop focused on the seismic analysis and design of long-span bridges and those bridges that use advanced technologies to improve their earthquake performance. Twenty-two papers on these topics were presented at the workshop, evenly divided between Chinese and U.S. experts. About 36 researchers and graduate students participated in the event. US delegates included George Lee, MCEER, Ian Buckle, University of Nevada, Reno, W.

Phillip Yen, Federal Highway Administration (US members of the workshop steering committee), and Jamshid Ghaboussi, University of Illinois at Urbana-Champaign, Scott Ashford, University of California, San Diego, Harry A. Capers, Jr., New Jersey Department of Transportation, Charles Seim and John Sun, T.Y. Lin, International, and M. Saiid Saiidi, University of Nevada, Reno.

Lichu Fan and Mengling Lou, Tongji University and Weigang Bao, PRC Ministry of Construction, served on the Workshop Steering Committee for the PRC side. Other presenters included Liying Nie, Jun-jie Wang, Gui-ping Yan, Ai-jun Ye, Shi-de Hu, Yuan-de Xue, Jianzhong Li, and Tian-bo Peng, of Tongji University, and Xi Zhu and Qing-shan Yang, Northern Jiaotong University.

The workshop included a technical study tour of the Lupu bridge, a tied arch bridge under construction over the



■ Prof. Fan, Ms. Xu, and Prof. Hu pose on the Lupu bridge during the technical study tour.

Huangpu River in Shanghai. When completed next year, this bridge will set a new record for span length. At 550 m it will exceed the span of the New River bridge in West Virginia by 32 m. It will be the fourth long-span crossing over the Huangpu River, joining the Nanpu, Yangpu, and Xupu bridges, all of which are cable-stayed spans. The lead designer of the energy dissipation system in the main span was Professor Shi-de Hu, one of the organizers of the Workshop. Proceedings are anticipated in late 2002. ♦

PRC-US Protocol Delegation visits Las Vegas, Reno and Stanford



■ PRC-US participants (from left) Prof. Wang, Deputy Director Wu, Ms. Zhang, Prof. Qi, Prof. Ye, Prof. Buckle and Ms. Jia enjoy dinner in Reno.

Officials from the China National Natural Science Foundation, China Seismological Bureau and the Ministry of Construction, together with four leading Chinese earthquake engineering researchers, visited the United States in

June as part of the PRC-US Protocol (Annex III) project sponsored by the National Science Foundation. They visited Las Vegas and Reno, Nevada, and Stanford and San Francisco, California.

In Las Vegas, the group held a formal meeting to review progress of existing joint research activities and to discuss possible joint future projects between China and the U.S. The technical tours for the PRC delegation included a two-day trip to the University of Nevada at Reno, where they visited the Seismology Lab in the Mackay School of Mines and the Large-Scale Structures Lab in the Department of Civil Engineering. Delegates viewed progress with the installation of a third shake table in the structures lab (an NSF-NEES project) and heard presentations from graduate students on

current research. They also visited the MacKay Building, an historical building on the Reno campus that has been seismically updated using base isolation. They then traveled to the John A. Blume Earthquake Engineering Center at Stanford University for a half-day tour of the Center and the structural engineering laboratory. They heard presentations from faculty at the Blume Center on current research and exchanged ideas for potential collaboration.

Delegates on the U.S. side included George Lee (coordinator), S.C. Liu, Ian Buckle, Peter Chang, Franklin Cheng, Weimin Dong, Anne Kiremidjian and Bill Spencer; the PRC side included Huijuan Wu, Xiaozhai Qi, Guojiang Li, Yayong Wang, Lieping Ye, Shu Jia and Jiping Ru. ♦

International Conference Attracts over 200 Earthquake Hazard Mitigation Professionals to China



■ Participants at the Harbin conference gather for a group photograph.

The *International Conference on Advances and New Challenges in Earthquake Engineering Research* was held August 15-20, 2002 in Harbin and Hong Kong, China. The focus of the conference was on research in the development and application of advanced technologies in earthquake engineering. Participants included many leaders in the earthquake hazard mitigation and response field, primarily from China, Japan, Korea, Taiwan, and the U.S. Professors X-Z Qi, Harbin, and J-M Ko, Hong Kong, chaired the International Advisory Committee. Other members of the committee included S-P Chang, Korea; and G.C. Lee, S.C. Liu and B.F. Spencer, Jr., all of the United States.

Over 200 people attended the Harbin component of the conference, hosted by the Institute of Engineering Mechanics (IEM), China Seismological Bureau (CSB). The conference was held August 15-17, 2002, and focused on new challenges and innovative solutions in earthquake engineering. It featured a special session dedicated to the 90th anniversary of the birth of the late Professor Liu Huixian, who is considered to be the founder of earthquake engineering in China, and was the first director of IEM. At the end of the technical sessions, IEM

hosted the first annual meeting of ANCER, the Asian-Pacific Network of Centers for Earthquake Engineering Research. Participants were also given a complimentary copy of the new *Journal of Earthquake Engineering and Engineering Vibration* and encouraged to submit future articles for publication.

The Hong Kong conference component, hosted by the Hong Kong Polytechnic University (HK Poly U), was held August 19-20, 2002, and emphasized

problems that concern areas of moderate seismicity and intelligent infrastructure engineering. This segment of the conference was also well-attended, and was sponsored by the Hong Kong Institution of Engineers, Environment, Transport and Works Bureau, and the Government of the HKSAR.

Proceedings are currently being compiled from both the Harbin and Hong Kong events, and will be available in the near future. ❖

MCEER students **Mettupalayam Sivaselvan** and **Diego Lopez Garcia**, from the Department of Civil, Structural and Environmental Engineering at the University at Buffalo, were among those who attended a Symposium in Honor of Professors Ray Clough and Joseph Penzien at the University of California, Berkeley. The Symposium was held on May 10-11, and was organized by CUREE (Consortium of Universities for Research in Earthquake Engineering). The organizers applied for and obtained a grant from the National Science Foundation to support attendance of doctoral students and junior faculty from U.S. universities through travel grants. Around 50 Ph.D. students and junior faculty were selected to attend the symposium.



2002 National Science Foundation Student Retreat

The MCEER SLC organized and participated in the 2002 National Science Foundation's Student Retreat, which was part of the 2002 ERC Annual Meeting, in Washington, D.C. Planning for the November 2 retreat began in September and the MCEER SLC organizers (Jeff Berman, President, Rory Connell, Vice President, and Benedikt Halldorsson, Activities Coordinator) worked closely with NSF representatives to create an informative day for all participants, which included student representatives from all 18 Engineering Research Centers.

The retreat began with a social breakfast and poster viewing session, followed by a welcome from Jeff Berman, MCEER SLC President. The first of two guest speakers, Dr. Alan Krauss of Schneider Electric/Aerotek Inc., set a great tone for the rest of day's presentations. Founder of the SLC at the Georgia Tech Packaging Research Center, Dr. Krauss inspired

the audience to be active participants in SLC activities and discussed how the SLC and ERC experience has helped him succeed professionally. Following Dr. Krauss, Deputy Division Director and Leader of the ERC team for NSF, Lynn Preston, spoke on the important role the SLC plays in ERCs and told the students what NSF would like them to get out of SLC participation. It was certainly inspiring to hear how NSF would like to develop more successful graduates via the SLC.

A majority of the day consisted of presentations from representatives of each ERC on the activities of their respective SLCs. It was truly a unique opportunity to share ideas on all types of activities, as well as on how to keep members active and energized. The MCEER SLC will be implementing some new ideas as a result of this retreat, including an online SWOT analysis that will be done over the SLC webpage.



■ Andrea Dargush, Lynn Preston and Jeff Berman at the NSF Student Retreat

A second guest speaker, Vance Bjorn, Founder and Chief Technology Officer of Digital Persona, Inc., gave an excellent talk over lunch about how the Engineering Center for Neuromorphic Research and CalTech helped propel his company, which makes fingerprint recognition systems for computers, to enhance security and maybe someday replace passwords. The retreat concluded with closing remarks from Jeff Berman and a social reception. ❖

--Submitted by Jeff Berman,

University at

Buffalo

Student Spotlight

Seyed Ali Ashrafi, known as Ali, is studying to obtain his Master of Science degree in Structural Engineering through the Department of Civil and Environmental Engineering at New Jersey Institute of Technology. His advisor is Professor M. Ala Saadeghvaziri. His research thesis is on the analytical study of rehabilitation of critical electric power system components with an emphasis on using friction pendulum systems to mitigate the seismic risk. He has performed finite element modeling of friction pendulum systems and has used the results to study the effects of earthquakes on bushing-transformer system and their interaction with other interconnecting elements in a substation. He plans to graduate in spring 2003.



■ Ali poses in San Francisco with Alcatraz in the background

When asked how he became interested in earthquake hazard mitigation, Ali said, "High seismic risk in Iran was the initial thing that started my interest in earthquake engineering. During my undergraduate studies, I was involved in a comprehensive study on seismic risks threatening Tehran (Iran's capital) and the ways to mitigate that seismic risk. The study gave me a very wide perspective both of the diversity and severity of the threats and different approaches to handle the problem. Since then, I realized my intense interest in earthquake engineering and focused my energy on it through the courses I took and the research projects in which I engaged."

After graduation, Ali plans to start a Ph.D program, and is in the process of applying for that now. After he obtains his Ph.D., he will decide whether to go into an academic or professional career.

When not focusing on earthquake hazard mitigation, Ali said he has a "deep interest in politics and philosophy." Much of his free time is spent on reading in these areas. He also spends time with friends during the weekends. ❖

MCEER Cosponsors Seventh National Conference



MCEER was one of several co-sponsors of the *Seventh National Conference on Earthquake Engineering* (7NCEE), held July 21-25 at the Park Plaza Hotel in Boston. For the first time in the history of this major conference, a northeastern U.S. location was selected, lending itself well to the conference theme, "Urban Earthquake Risk." The event, which is held every four years under the sponsorship of the Earthquake Engineering Research Institute (EERI), attracted over 600 participants from around the world.

An extensive multidisciplinary program was developed, which included 67 technical sessions consisting of 450 papers, and complemented by special sessions and panel discussions. Student poster sessions allowed these new EERI members to present their work.

With the help of the Boston Society of Civil Engineers Section/ASCE, the Boston location offered participants unique opportunities to visit such impressive examples of civil engineering as the Central Arterial Project (otherwise known as the "Big Dig") and the Hancock Tower, with its tuned mass damper system. Several attendees also made a field trip to the historic Weston Seismological Observatory in suburban Boston.

One of several highlights of the five-day conference was an evening debate by opposing panels of earthquake professionals, moderated by Michel Bruneau. The "Yes" and "No" teams parried dryly and convincingly to sway the audience to their respective sides on the issue: "It will take a devastating earthquake east of the Rockies to ensure that national earthquake-resistant requirements become mandatory." The arguments and clever repartee offered by each side were equally provocative and entertaining; yet

in the end, the audience returned a resounding vote for the "No" side. Participants agreed it was an enjoyable way to end the day.

Luncheon speaker Robert Ivey provided a fascinating review of an immense and controversial civil engineering liability case. At the conclusion, Professor Robert Whitman, MIT, was lauded for his tremendous contributions to the field of earthquake engineering.

MCEER extends its thanks to Susan Tubbesing, EERI Executive Director and the EERI dedicated staff, and recognizes the hard work and commitment of the 7NCEE Steering Committee: George C. Lee, Michel Bruneau, and Andrea Dargush (MCEER), Technical Co-Chairs Andrei Reinhorn (University at Buffalo) and Adam Rose, Penn State University; and Thomas O'Rourke (Cornell University), Iqbal Ahmed (GEI Consultants), and Malek Al-Khatib (Gannett Fleming, Inc.). Special thanks also go to all the session organizers, moderators and panelists who contributed to a most successful meeting.

Copies of the proceedings are available by contacting EERI at (510) 451-0905 or <http://www.eeri.org>. ♦



■ Immediately before the 7NCEE, EERI organized an Earthquake Reconnaissance Team Training session. Diego Lopez Garcia and Benedikt Halldorsson joined faculty, professionals and students from all over the U.S. in the session.



■ SLC students were joined by MCEER's REU students at this year's retreat.

Student Leadership Council Activities

During the summer and fall of this year, students in MCEER's Student Leadership Council (SLC) held an exclusive meeting, and took part in a variety of events held throughout the country.

The SLC's major activity was its third annual retreat, where members discussed current issues facing the SLC, communicated with each other about their research progress, and agreed upon several future activities. The retreat was hosted by the University at Buffalo, on August 2-4, 2002 at the University Inn.

The retreat commenced with an ice-breaker and evening meeting at the University Inn followed by dinner in the city. This was a good opportunity for students to bond, get familiar with the new faces and have casual talks.

On Saturday, the official schedule of the retreat began with opening remarks by Jeff Berman, SLC president, followed by presentations by the members on their research and plans for further continuation of their work. The presentations were divided into short, five-minute presentations by students who had just begun their research and long, 15-minute presentations by the other students. Time for questions was included.

The diversity of research programs supported by MCEER and the universities hosting these projects was well projected

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Annual REU Symposium Held in Colorado

Research Experience for Undergraduates (REU) is a summer internship opportunity sponsored by the National Science Foundation (NSF) each year. Students interested in expanding their knowledge of earthquake engineering and related fields are selected to participate at one of the centers: MCEER, Pacific Earthquake Engineering Research (PEER) center, and Mid-America Earthquake (MAE) center. Each student is paired with a faculty member to work on a research project of interest. This year MCEER sponsored three students; Dan Fenz, University at Buffalo, Robert Payne, Cornell University and Nishadi Karunaratne, Catholic University of America.

Culminating the eight-week internship, students from across the nation converged in Keystone, Colorado for the 2002 student symposium. This year's event was organized by the MAE Center. Seventeen students from the three earthquake centers assembled at the beautiful Keystone ski resort for two days of presentations, educational field trips and some adventure. Although the forum was entirely professional, the atmosphere remained relaxed and comfortable throughout the weekend. A variety of research projects relating to earthquakes were presented and discussed, which served to further exemplify the numerous options available to them in the earthquake engineering field.



■ Attendees at the 2002 REU Symposium pose for a group picture.

An opening reception offered an icebreaker for the students and staff to get to know each other before the commencement of the symposium. In addition to the research presentations, the students got an opportunity to explore Golden, Colorado and gain some valuable information through several educational field trips. A most interesting tour was of the National Earthquake Information Center (NEIC), which is part of the United States Geological Survey (USGS). The NEIC operates 24-hours-a-day to determine the location and magnitude of significant earthquakes in the U.S. and around the world rapidly and accurately as possible. The tour was led by Dr. Waverly Person, an expert in earthquakes and dubbed as being a human earthquake encyclopedia. The next tour was of the Colorado School of Mines in Golden, Colorado where Dr. Panos Kiouisis and Dr. Richard Christensen discussed the school and several earthquake related topics.

Concluding the presentations, Dr. Ed Harris of Texas A & M University gave a talk on engineering ethics. He discussed possible conflicts that could arise and advised the students to always seek a compromising middle ground solution. The students were then divided into groups and given several ethical issues to discuss and present. The symposium was concluded by a dinner banquet, followed by an enlightening guest speaker, Ross B. Corrotis. Dr. Corrotis is currently a professor, and former dean of engineering at the University of Colorado. He was also a former NSF graduate fellow while he was a student at MIT.

There were many social activities available in Keystone as well. Some outdoor activities included hiking, kayaking, mountain biking, and a blue grass festival to name just a few. Therefore, within just two days the students were easily able to develop lasting friendships with



■ MCEER REU students (from left): Robert Payne, Nishadi Karunaratne and Daniel Fenz pose with Andrea Dargush, MCEER, outside the symposium venue in Keystone, Colorado.

each other. The symposium offered the participants a rare opportunity to meet with peers with a mutual interest, and to share their work with each other. Without a doubt, the 2002 student symposium in Keystone, Colorado was a remarkable success.

Proceedings of the event are being compiled by the MAE center. A limited number of proceedings from last year's event are available from MCEER Publications, phone: (716) 645-3391, ext. 105, (MCEER-02-SP06).❖

--Submitted by Nishadi Karunaratne,
Catholic University of America

Applications are being accepted to participate in the US/PRC Research Exchange Program in earthquake studies. Information about the program and applications are available from our web site at <http://mceer.buffalo.edu>. For more information, contact Andrea Dargush at (716) 645-3391 ext. 106, or via e-mail: dargush@acsu.buffalo.edu. The application deadline is January 31, 2003.

UB-MCEER-EERI Seminar Series at the University at Buffalo

The EERI student chapter of the University at Buffalo (UB-EERI), the MCEER Student Leadership Council, the Networking and Education Programs of MCEER, and the University at Buffalo's Department of Civil, Structural and Environmental Engineering jointly sponsor a series of seminars on a variety of topics related to earthquake hazard mitigation. The purpose of the seminar series is to widen accessibility to timely, technical presentations by students, researchers, visitors and affiliates of MCEER. Previous seminars have been broadcast over the Internet in real-time, and can be viewed anytime at <http://civil.eng.buffalo.edu/webcast>. However, due to current construction at Ketter Hall, this seminar could not be webcast.

Development of Post-Tensioned Energy Dissipating Connections for Steel Moment Resisting Frames

Dr. Andre Filiatrault, University of California at San Diego

On Friday, September 20, 2002, Dr. Andre Filiatrault of University of California at San Diego gave a lecture entitled "Development of Post-Tensioned Energy Dissipating Connections for Steel Moment Resisting Frames." It was the tenth presentation in the ongoing seminar series on earthquake engineering topics held at the University at Buffalo.

Mr. Darren Vian, Ph.D. candidate at the Department of Civil, Structural and Environmental Engineering (CSEE), president of the UB-EERI Student Chapter, and member of the MCEER Student Leadership Council (SLC), opened the seminar by welcoming the audience. The lecturer was introduced as well by Dr. Michel Bruneau, Professor and MCEER Deputy Director, who talked about the outstanding research trajectory of the speaker.

Dr. Filiatrault began his presentation by introducing the features of the post-tensioned energy dissipating connections (PTED), and how the self-centering characteristics can be achieved by means of post-tensioned bars without the need of full penetration welds between the flanges of the beams and the columns.

The PTED system is a combination of two important elements:

- High strength post-tensioned (PT) steel bars, designed to remain elastic during the seismic response, and therefore, provide self-centering forces in order to ensure small residual drifts after the earthquake.
- Confined energy-dissipating (ED) bars, designed to yield in both tension and compression.

The work presented by Dr. Filiatrault is the result of an analytical and experimental study conducted at University of California at San Diego. The analytical model of PTED connections was performed idealizing the post-tensioned bars as nonlinear elastic elements, and the energy-dissipating bars as elements with hysteretic behavior. The analytical results were verified by experimental evaluations of a half-scale steel moment resisting frame. Exterior and interior connections were tested and the results were in good agreement with the analytical model.

According to Dr. Filiatrault, with a properly proportioned post-tensioned force, no shear connection is required between beam and column. The shear is transferred through Coulomb-type friction at the beam-to-column interface. Therefore, a special treatment of the steel surfaces would increase the friction coefficient and the shear capacity of the connection. Furthermore, the dowel action of the ED

and the PT bars provide a redundant mechanism in the case of a loss of the post-tensioned force.

The analytical model as well as the cyclic test showed that the PTED connection has the capability to undergo large deformations, and producing significant energy dissipation, without compromising the integrity of the surrounding structure (i.e., beams and columns remain undamaged, without residual drift).

Dr. Filiatrault is expanding his work on this concept of an energy dissipating system. Future investigation will be focused on other interesting aspects, such as the reliability verification of the friction shear transfer mechanism, and the system response incorporating the effect of a concrete slab supported by the beams.

Dr. Filiatrault's presentation was received by generous applause, after which Mr. Vian moderated the discussions. After Dr. Filiatrault answered some questions from the audience, the seminar was closed.❖

- Submitted by Ramiro Vargas, UB-EERI vice-president, University at Buffalo

Note: A review of Reginald Des Roches seminar, "Seismic Retrofit Using Shape Memory Alloys," held October 28, 2002, will be included in the next issue of the Bulletin.

MCEER Participates in 2002 Earth Science Day

MCEER was one of 20 exhibitors at



the 5th Annual Earth Science Day at the Penn Dixie Paleontological and Outdoor Education Center in Western New York on October 19, 2002. In spite of inclement weather, several hundred children and adults attended the event, which featured numerous displays, activities and demonstrations to highlight the role of the earth sciences in research, industry and policy. The MCEER exhibit, hosted by Andrea Dargush, offered hands-on activities and take-home materials illustrating the interaction between earth science and engineering in the study of earthquakes and earthquake-resistant design.

Earth Science Day is held at the culmination of National Earth Science Week, a nationwide initiative to educate the public about the role of earth science in daily life and its contributions to the ad-

vancement of science. Earth Science Week was established in 1998 by the American Geological Institute (AGI) to give students and citizens new opportunities to discover the earth sciences and to encourage stewardship of the earth. It highlights the important contributions that earth and environmental sciences make to society and invites the public to become engaged in current scientific exploration. Earth Science Week celebrations including field trips, contests, exhibits, school visits and open houses took place across the country and around the world. More than 150 museums, science centers, libraries and bookstores participated in this year's events, with many national parks hosting special activities. This year, AGI's efforts to coordinate Earth Science Week were supported by generous grants from the USGS and the American Association of Petroleum Geologists Foundation. The Institute provides a public-outreach web site at <http://www.earthscienceworld.org>. ❖

EQNET Hits 100,000 Mark

In October, EQNET, the Earthquake Information Network, at <http://www.eqnet.org>, had logged more than 100,000 hits, recorded since November, 1999, when the counter was first installed. Funded by the Federal Emergency Management Agency (FEMA), EQNET is a one-stop web source of authoritative, current earthquake information, which is sponsored by the Earthquake Information Provider's Group (EqIP), a consortium of earthquake information providers.

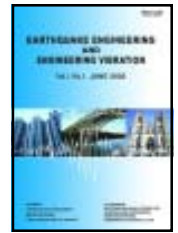
A useful research feature of EQNET is the Archives category, which provides access to web reports from recent significant earthquakes. For example, if a researcher wishes to access a web report

or an image that had appeared at the time of the Nisqually Earthquake of February, 2001, chances are, these resources can be found in the EQNET Archives even years after the event.

During the past year, EQNET was favorably reviewed in *ResearchBuzz*, an online newsletter devoted to Internet research news, web databases, and search engines. EQNET was also cited in NSF's *Sci-Tech Library Newsletter*. For more information, contact the EQNET webmaster, Sheryl Soborowski via phone: (716) 645-3377; fax: (716) 645-3379; or e-mail: sks5@mceermail.buffalo.edu. ❖

New Journal Seeks Submissions

The *Journal of Earthquake Engineering and Engineering Vibration* is currently seeking submissions for upcoming issues. This is a new peer-reviewed journal



published by the Institute of Engineering Mechanics (IEM), China Seismological Bureau, in cooperation with MCEER. Topics include: evaluations of damage to structures and engineering systems resulting from recent earthquakes; new observations of strong motion characteristics and data processing techniques; seismic risk and hazard analysis of civil infrastructure systems; site effects on structures and geotechnical engineering; seismic behavior and design criteria for buildings and lifeline systems; advances in structural dynamics relevant to earthquake engineering; theory and practice of health monitoring for structures under extremely loading; retrofit strategies for existing infrastructure systems; application of emergency sensing, monitoring, and high performance materials; and structural vibration under wind, wave and other dynamic loadings.

The Journal is indexed/abstracted in Quakeline® database (MCEER), Earthquake Engineering Abstracts® (NISEE), GeoRef (AGI) and the Transportation Research Information Services (TRIS) database, Transportation Research Board of the National Academies. In addition, the Journal is being considered for inclusion in a number of other indexes.

Manuscripts for consideration should be sent to: Editor, *Journal of Earthquake Engineering and Engineering Vibration*, MCEER, University at Buffalo, Red Jacket Quadrangle, Buffalo, NY 14261; e-mail: jeev@mceermail.buffalo.edu. For more information, visit the journal's web site at: <http://mceer.buffalo.edu/jeev/>. ❖

New MCEER Reports

MCEER technical reports are published to communicate specific research data and project results. Reports are written by MCEER-funded researchers, and provide information on a variety of fields of interest in earthquake engineering. The proceedings from conferences and workshops sponsored by MCEER are also published in this series.

MCEER's web site offers a complete list of technical reports, abstracts, and prices. The publications catalog allows users to search the report list by subject, title and author, and to place orders for these reports.

Visit the site at <http://mceer.buffalo.edu/publications/default.asp>.

Proceedings of the MCEER Workshop on Lessons from the World Trade Center Terrorist Attack

Edited by M. Bruneau, 10/18/02;
MCEER-02-SP08, 172 pages plus two CD-ROMs, \$35.00

Over 100 experts from a wide variety of backgrounds participated in *Lessons from the World Trade Center Terrorist Attack: Management of Complex Civil Emergencies and Terrorism-Resistant Civil Engineering Design*, held in New York City on June 24-25, 2002. The proceedings summarize the findings from the workshop and include, in digital format (on CD-ROM), the presentations made by most of the speakers. This special format was designed to share, to the fullest extent possible, the visuals and video-clips that constituted an essential part of some presentations and greatly enriched communication of the concepts presented. Complementing these electronic presentations are abstracts from most presentations and short biographical sketches of most authors. Finally, a few authors volunteered additional longer technical documents, which are included on the CD-ROM.



Student Research Accomplishments: 2001-2002

Edited by D. Lopez Garcia, 10/02,
MCEER-02-SP09,
146 pages, \$25.00

MCEER's Student Leadership Council (SLC) published the second edition of its *Student Research Accomplishment* report. This year's report was edited by Diego Lopez Garcia, Ph.D. candidate in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo. It contains 22 papers that describe research in progress. The papers are categorized by MCEER's NSF program Research Thrust Areas: Overarching Center-Wide Cross Program Research Activities (2 papers); Seismic Evaluation and Retrofit of Lifeline Systems (4 papers); Seismic Retrofit of Acute Care Facilities (9 papers); Earthquake Response and Recovery (2 papers); Supplemental Research Activities (1 paper); and Education (4 papers). The report is available from the publications section of our web site at http://mceer.buffalo.edu/publications/sp_pubs/02-SP09/default.asp. A limited number of copies are available by contacting MCEER publications.



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SLC Activities

(Continued from page 7)

in the presentation topics. Overall, 12 students from five different universities made presentations. A pleasant addition to this year's retreat was presentations by three REU students. Robert Payne, Nishadi Karunarathne and Dan Fenz provided the SLC members with the results of their work and in return, obtained valuable feedback and encouragement (see page 8).

Following the presentations, attendees discussed upcoming events and updated everyone on the status of current issues, such as the 2002 *Student Research Accomplishments (SRA)*, edited by Diego Lopez Garcia (see page 11), and open positions in SLC after some of the current officers graduate.

Also discussed was the 2002 NSF Student Retreat (see page 6), the 2003 MCEER Annual PI Meeting, and the 2003

SLC Retreat. The meeting concluded with a presentation by guest speaker Dr. Oguz Cem Celik on "Lessons Learned From the Recent Turkey Earthquakes."

Finally, a number of students attended the 7NCEE in Boston, held on July 21-25 (see page 7). The students, all of whom participated in the poster sessions, presentations, and other conference activities, found time to join a group of MCEER researchers and staff, past and present, for a dinner at Skipjack's Seafood Restaurant. The dinner gave students the opportunity to socialize with colleagues from other schools, as well as the various MCEER researchers in attendance.

The SLC students are keeping in touch with each other through the SLC group e-mail list or contacts with Jeff Berman, the president of the SLC. ❖

--Submitted by Seyed Ali Ashrafi, New Jersey Institute of Technology



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